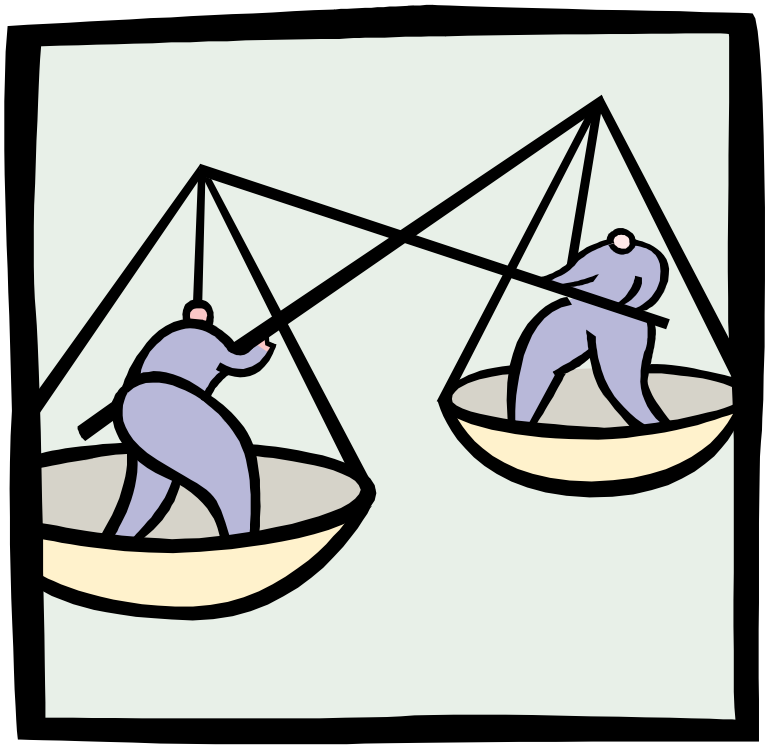
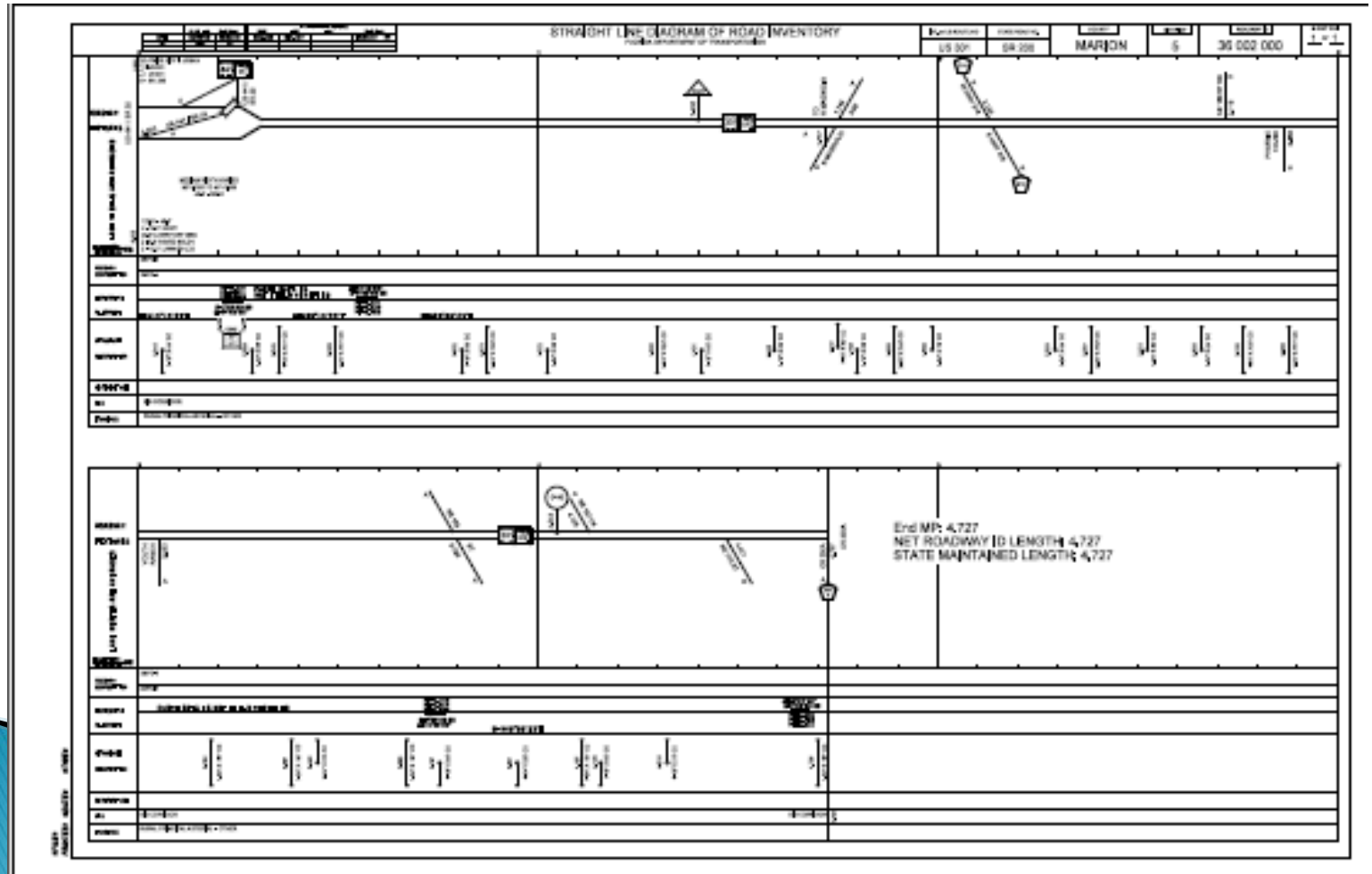
Mile Posts on Construction Plans

Aren't Mileposts And Stations The Same?

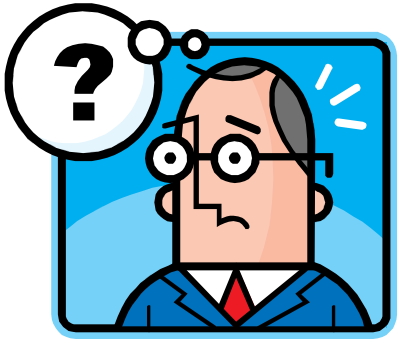


Where do M.P. come from?

- Most of the plan milepost data is “designed” from our straight-line diagrams.



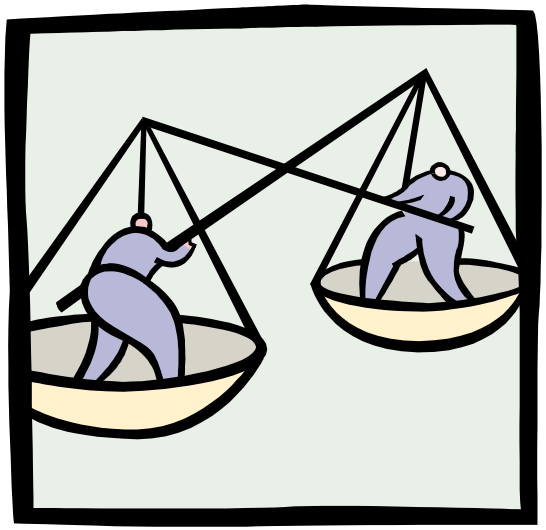
What do we know about SLD's?



- RCI Planning Data Handbook
  - (July 2013)
  - Urban / Rural Milepost Tolerances
    - The maximum allowable deviation inside an urban area boundary is 0.010 mile (+/- **53 feet**). The maximum allowable milepost deviation is 0.050 mile (+/- **264 feet**) outside an urban area boundary (rural area).
    - http://www.dot.state.fl.us/planning/statistics/rci/rcidatahandbook.pdf

Mileposts =Stations?

- Station 0+00 to Station 52+80 = 5,280 feet
- What about mile posts?
- A mile equals a mile, right?



- Mile Post 0.000 to Milepost 1.000 =
  1.0 = 5,280 feet (+/- 264 feet in rural areas)
  5,016 feet =< 1.0 mile =< **5,544 feet**

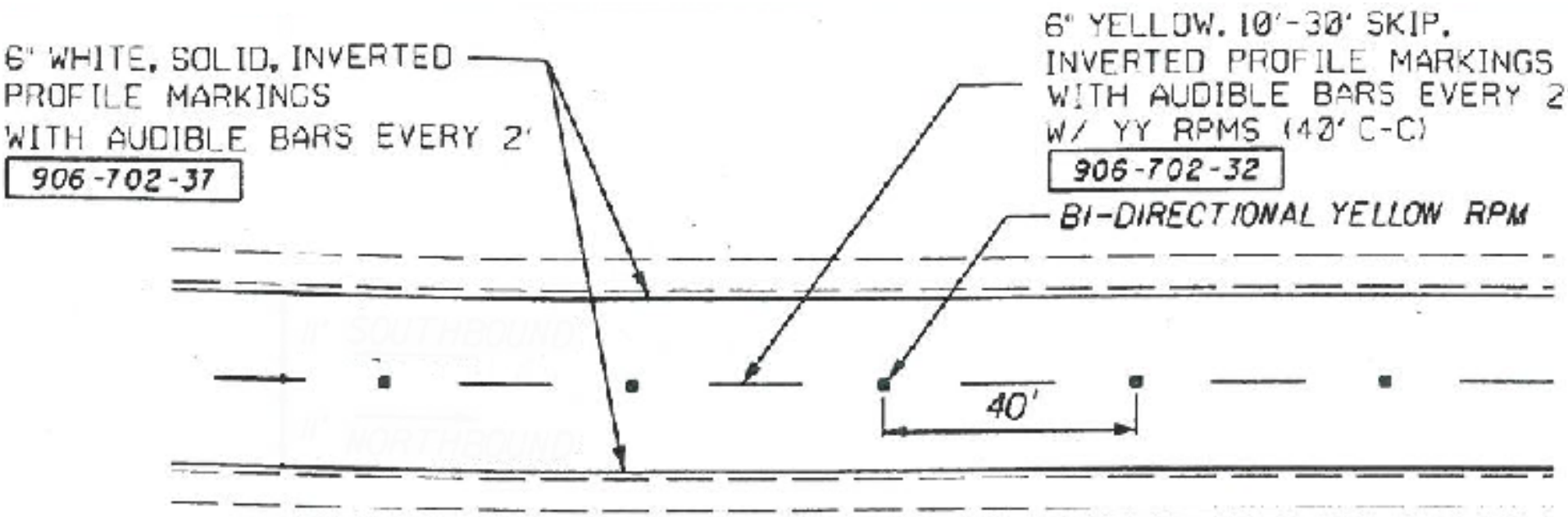
- Mile Post 0.000 to Milepost 1.000 =
  1.0 = 5,280 feet (+/- 53 feet in urban areas)
  5,227 feet =< 1.0 mile =< **5,333 feet**

- So now that we know the accuracy of the mileposts, lets take a look at some real world examples of where they shows up

Example #1

- The project only included restriping of a two lane roadway for safety upgrades.
- The passing zones were called out in mileposts.
- Did not start or finish at a joint or intersection.

Example #1



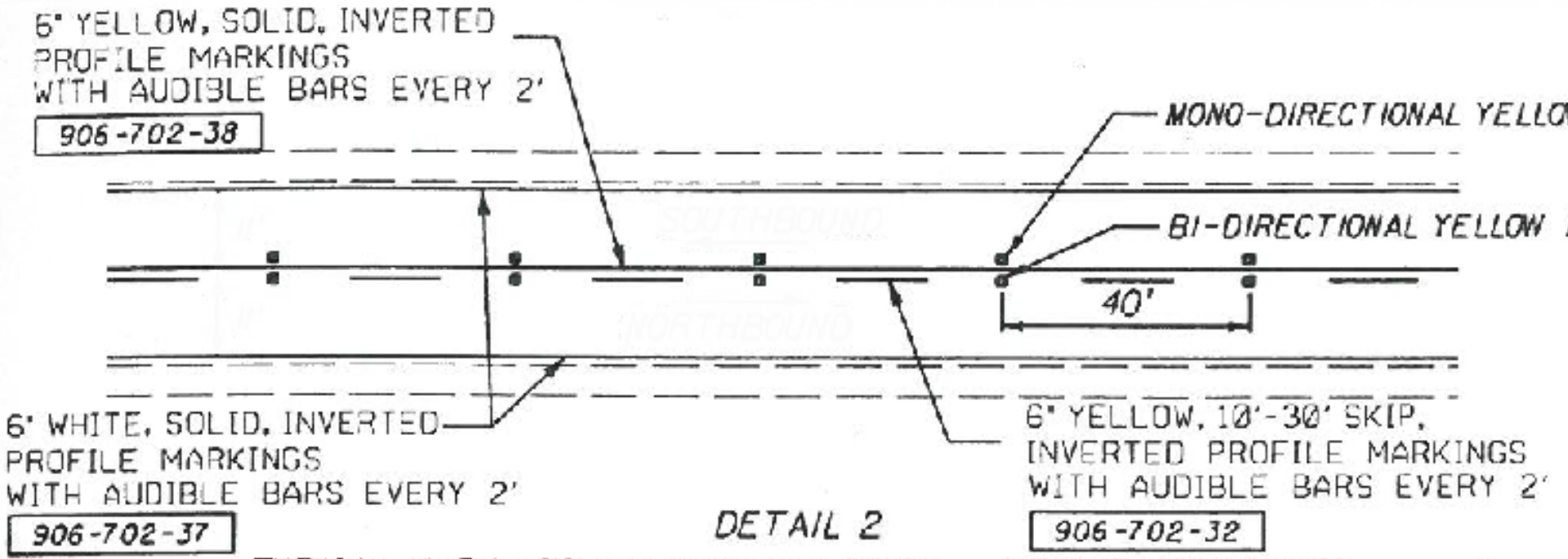
DETAIL 4

TYPICAL MARKINGS (PASSING ZONE - NORTHBOUND AND SOUTHBOUND)

N.T.S.

M.P. 5.175 TO M.P. 5.417	M.P. 8.429 TO M.P. 8.982	M.P. 10.235 TO M.P. 10.487
M.P. 6.125 TO M.P. 6.293	M.P. 9.375 TO M.P. 9.917	M.P. 11.115 TO M.P. 11.465
M.P. 6.875 TO M.P. 7.277		M.P. 11.817 TO M.P. 11.928

Example #1



DETAIL 2

TYPICAL MARKINGS (NO PASSING ZONE - SOUTHBOUND ONLY)

N.T.S.

M.P. 5.417 TO M.P. 5.450	M.P. 8.982 TO M.P. 9.000
M.P. 6.293 TO M.P. 6.415	M.P. 9.917 TO M.P. 9.990
M.P. 7.277 TO M.P. 7.340	M.P. 10.487 TO M.P. 10.500
M.P. 8.370 TO M.P. 8.429	M.P. 11.775 TO M.P. 11.817

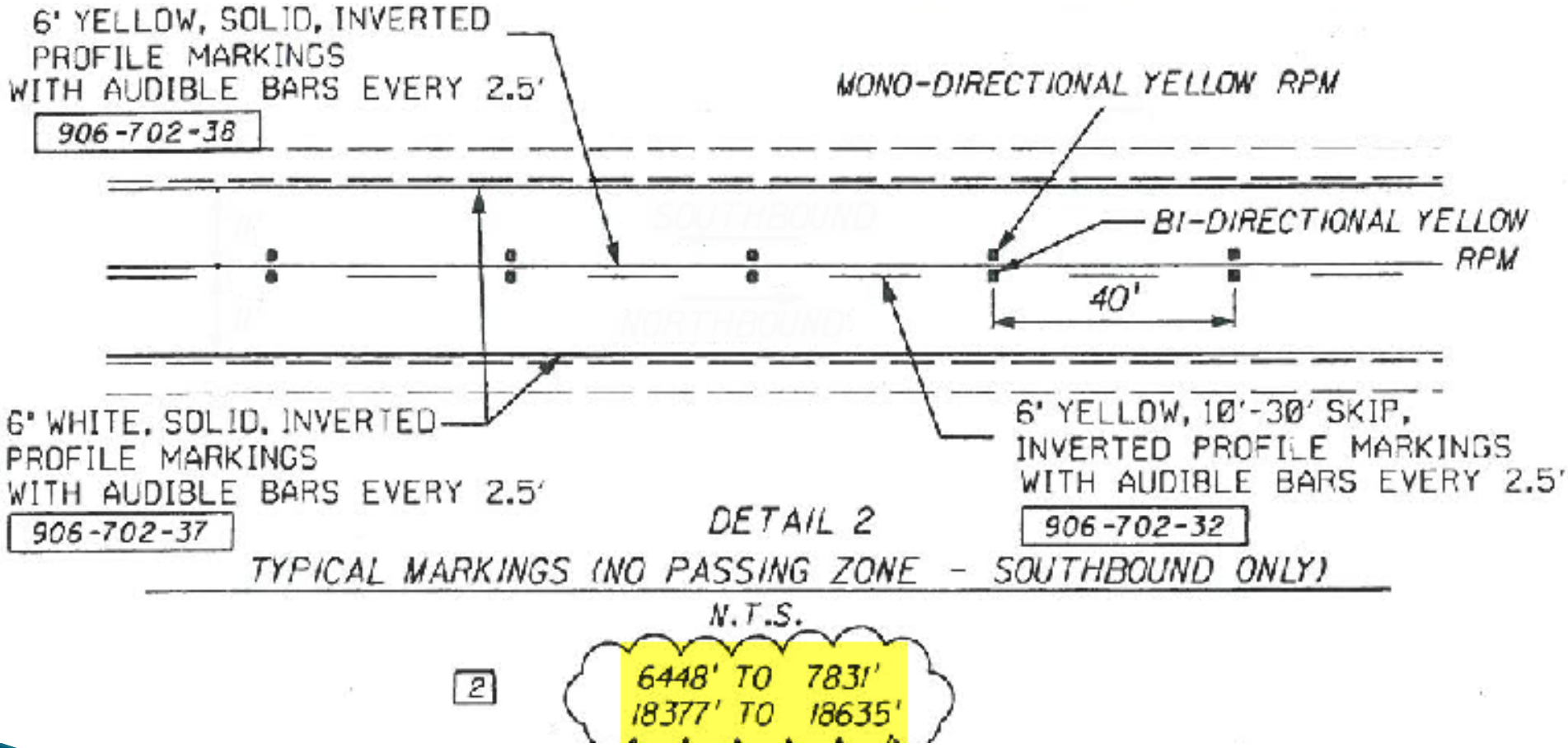
Project Issues

- Layout started becoming a problem
  - Lengths would not fit between side streets
  - Passing Zone would not fit within the available areas
  - Passing Zones extended farther onto vertical curves

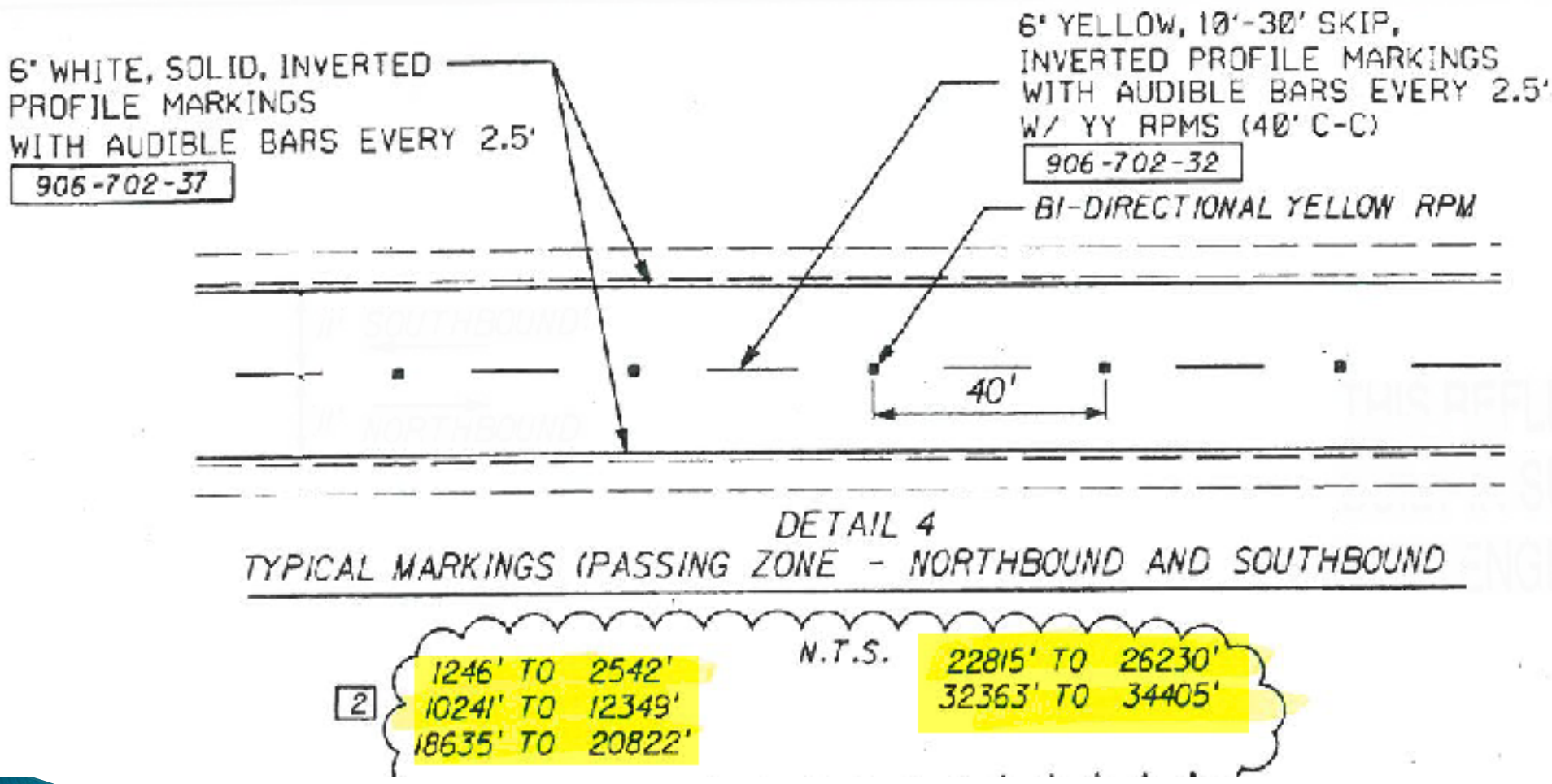
Example #1

- The actual layout in the field created sight-distance issues due to vertical curves
- The plan revisions were changed to linear measured from the beginning joint of the project to ease layout

Example #1


6" YELLOW, SOLID, INVERTED PROFILE MARKINGS WITH AUDIBLE BARS EVERY 2.5'
906-702-38
MONO-DIRECTIONAL YELLOW RPM
BI-DIRECTIONAL YELLOW RPM
40'
6" WHITE, SOLID, INVERTED PROFILE MARKINGS WITH AUDIBLE BARS EVERY 2.5'
906-702-37
6" YELLOW, 10'-30' SKIP, INVERTED PROFILE MARKINGS WITH AUDIBLE BARS EVERY 2.5'
906-702-32
DETAIL 2
TYPICAL MARKINGS (NO PASSING ZONE - SOUTHBOUND ONLY)
N.T.S.
2
6448' TO 7831'
18377' TO 18635'

Example #1


6" WHITE, SOLID, INVERTED PROFILE MARKINGS WITH AUDIBLE BARS EVERY 2.5'
906-702-37
6" YELLOW, 10'-30' SKIP, INVERTED PROFILE MARKINGS WITH AUDIBLE BARS EVERY 2.5' W/ YY RPMS (40' C-C)
906-702-32
BI-DIRECTIONAL YELLOW RPM
40'
DETAIL 4
TYPICAL MARKINGS (PASSING ZONE - NORTHBOUND AND SOUTHBOUND
N.T.S.
2
1246' TO 2542'
10241' TO 12349'
18635' TO 20822'
22815' TO 26230'
32363' TO 34405'

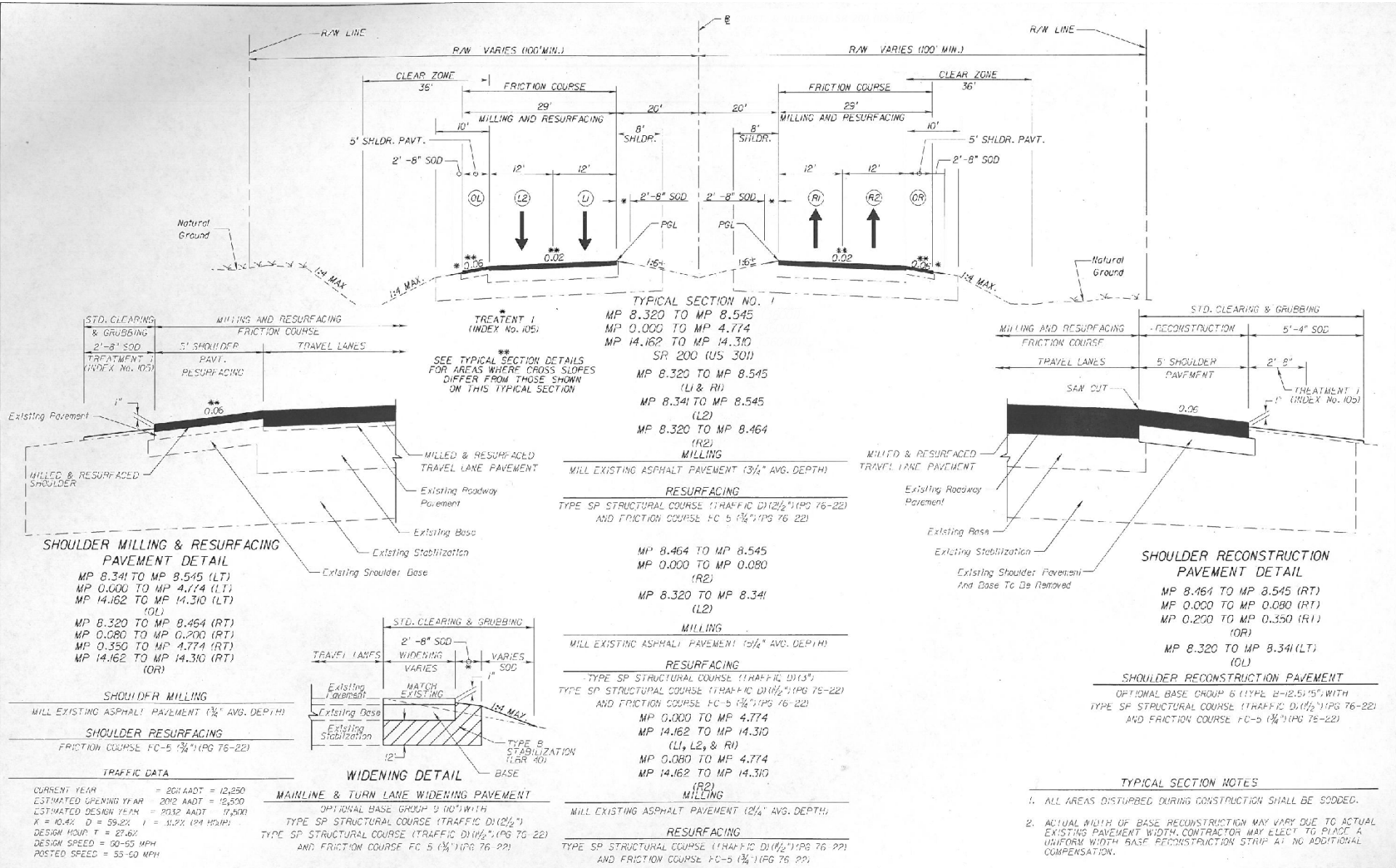
Example #2

- Approx 7 miles of Roadway
- Mill & Resurface
- Multiple Milling Depths
- Cross Slope Correction

Example #2

- Project Highlights
  - Project does not begin or end at a known pavement joint
  - 8 Different Milling / Paving Typical Sections
  - Cross slope corrections
  - 2 Different milepost equations over 3 road sections

Example #2



TYPICAL SECTION NO. 1

MP 8.320 TO MP 8.545
MP 0.000 TO MP 4.774
MP 14.162 TO MP 14.310
SR 200 (US 301)

** SEE TYPICAL SECTION DETAILS FOR AREAS WHERE CROSS SLOPES DIFFER FROM THOSE SHOWN ON THIS TYPICAL SECTION

MP 8.320 TO MP 8.545
(L1 & R1)
MP 8.341 TO MP 8.545
(L2)
MP 8.320 TO MP 8.464
(R2)

MILLING

MILL EXISTING ASPHALT PAVEMENT (3/4" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC D)(2 1/2")(PG 76-22) AND FRICTION COURSE FC-5 (3/4")(PG 76-22)

MP 8.464 TO MP 8.545
MP 0.000 TO MP 0.080
(R2)

MP 8.320 TO MP 8.341
(L2)

MILLING

MILL EXISTING ASPHALT PAVEMENT (3/4" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC D)(1")
TYPE SP STRUCTURAL COURSE (TRAFFIC D)(1 1/2")(PG 76-22)
AND FRICTION COURSE FC-5 (3/4")(PG 76-22)

MP 0.000 TO MP 4.774
MP 14.162 TO MP 14.310
(L1, L2, & R1)

MP 0.080 TO MP 4.774
MP 14.162 TO MP 14.310
(R2)

MILLING

MILL EXISTING ASPHALT PAVEMENT (2 1/4" AVG. DEPTH)

RESURFACING

TYPE SP STRUCTURAL COURSE (TRAFFIC D)(1 1/2")(PG 76-22) AND FRICTION COURSE FC-5 (3/4")(PG 76-22)

SHOULDER MILLING & RESURFACING PAVEMENT DETAIL

MP 8.341 TO MP 8.545 (LT)
MP 0.000 TO MP 4.774 (LT)
MP 14.162 TO MP 14.310 (LT)
(OL)
MP 8.320 TO MP 8.464 (RT)
MP 0.080 TO MP 0.200 (RT)
MP 0.350 TO MP 4.774 (RT)
MP 14.162 TO MP 14.310 (RT)
(OR)

SHOULDER MILLING

MILL EXISTING ASPHALT PAVEMENT (3/4" AVG. DEPTH)

SHOULDER RESURFACING

FRICTION COURSE FC-5 (3/4")(PG 76-22)

TRAFFIC DATA

CURRENT YEAR = 2011 AADT = 12,250
ESTIMATED OPENING YEAR = 2012 AADT = 12,500
ESTIMATED DESIGN YEAR = 2032 AADT 17,500
K = 10.4% D = 59.2% T = 31.2% (24 HOUR)
DESIGN HOUR T = 27.6%
DESIGN SPEED = 60-65 MPH
POSTED SPEED = 55-60 MPH

WIDENING DETAIL

MAINLINE & TURN LANE WIDENING PAVEMENT

OPTIONAL BASE GROUP 9 (10") WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC D)(2 1/2")
TYPE SP STRUCTURAL COURSE (TRAFFIC D)(1 1/2")(PG 76-22)
AND FRICTION COURSE FC-5 (3/4")(PG 76-22)

SHOULDER RECONSTRUCTION PAVEMENT DETAIL

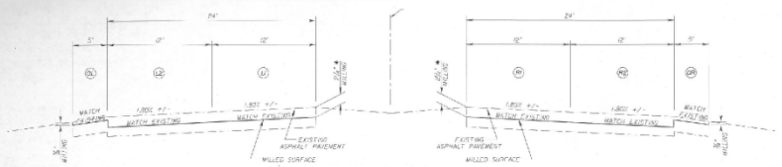
MP 8.464 TO MP 8.545 (RT)
MP 0.000 TO MP 0.080 (RT)
MP 0.200 TO MP 0.350 (R1)
(OR)
MP 8.320 TO MP 8.341 (LT)
(OL)

SHOULDER RECONSTRUCTION PAVEMENT

OPTIONAL BASE GROUP 6 (TYPE B-12.5)(5") WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC D)(1 1/2")(PG 76-22)
AND FRICTION COURSE FC-5 (3/4")(PG 76-22)

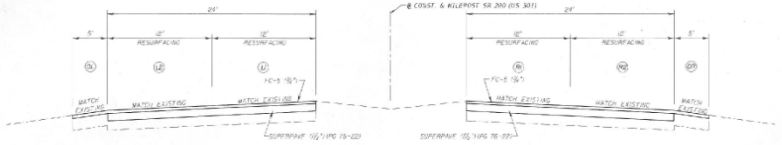
TYPICAL SECTION NOTES

1. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE SODDED.
2. ACTUAL WIDTH OF BASE RECONSTRUCTION MAY VARY DUE TO ACTUAL EXISTING PAVEMENT WIDTH. CONTRACTOR MAY ELECT TO PLACE A UNIFORM WIDTH BASE RECONSTRUCTION STRIP AT NO ADDITIONAL COMPENSATION.



MILLING DETAIL No. 1
WESTBOUND ROADWAY

MILLING DETAIL No. 1
EASTBOUND ROADWAY



RESURFACING DETAIL No. 1
WESTBOUND ROADWAY

RESURFACING DETAIL No. 1
EASTBOUND ROADWAY

WESTBOUND MILLING & RESURFACING DETAIL LIMITS

(L1, L2)	(L1, L2)
MP 8.341 TO MP 8.545	*MP 8.341 TO MP 8.545
MP 0.000 TO MP 3.681	MP 0.000 TO MP 0.541
MP 3.947 TO MP 4.774	MP 1.293 TO MP 3.681
MP 14.162 TO MP 14.330	MP 4.224 TO MP 4.774
	MP 14.162 TO MP 14.330

EASTBOUND MILLING & RESURFACING DETAIL LIMITS

(M)	(M2)	(R)
*MP 8.320 TO MP 8.464	*MP 8.320 TO MP 8.464	MP 8.320 TO MP 8.464
MP 0.280 TO MP 0.509	MP 0.080 TO MP 0.509	MP 0.080 TO MP 0.200
MP 0.768 TO MP 0.976	MP 0.768 TO MP 3.201	MP 0.350 TO MP 0.509
MP 2.405 TO MP 3.201	MP 3.408 TO MP 3.713	MP 0.768 TO MP 4.576
MP 3.488 TO MP 3.713	MP 4.310 TO MP 4.576	MP 14.281 TO MP 14.303
MP 4.310 TO MP 4.576	MP 14.281 TO MP 14.310	
MP 14.259 TO MP 14.310		

* DENOTES 3/4" MILL, 2 1/2" SUPERPAVE (FPG 76-221) AND 3/4" FC-5
(L1, L2, R1, R2)

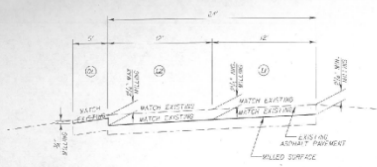
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

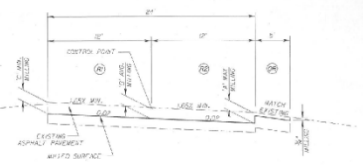
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

TYPICAL SECTION DETAILS

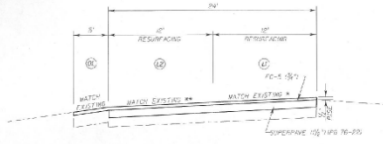
SHEET NO.



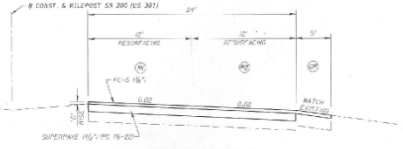
MILLING DETAIL No. 2
WESTBOUND ROADWAY



MILLING DETAIL No. 2
EASTBOUND ROADWAY



RESURFACING DETAIL No. 2
WESTBOUND ROADWAY



RESURFACING DETAIL No. 2
EASTBOUND ROADWAY

WESTBOUND MILLING & RESURFACING DETAIL LIMITS

MP 0.735 TO MP 1.250 *
MP 3.947 TO MP 4.224 **

* CROSS SLOPE VARIES FROM 1.60% TO 1.65%
** CROSS SLOPE VARIES FROM 2.05% TO 2.15%

EASTBOUND MILLING & RESURFACING DETAIL LIMITS

	MP 2.278 TO MP 2.405	MP 3.252 TO MP 3.478	MP 3.945 TO MP 4.810
LANE ID	R1, R2	R1, R2	R1, R2
"A" DEPTH	2½"	2½"	3"
"B" AVG DEPTH	2¼"	2¼"	2¾"
"C" DEPTH	2"	2"	2"
"D" RISE	¼"	¼"	¾"

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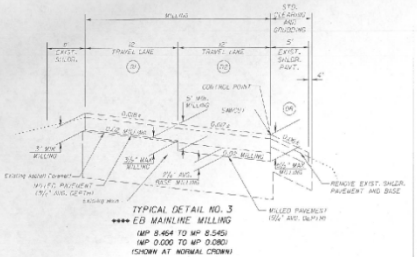
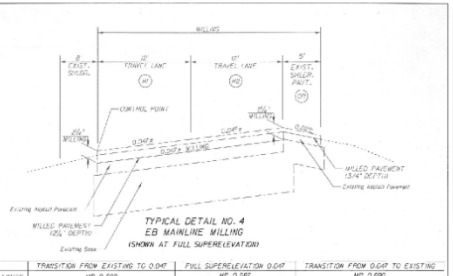
TYPICAL SECTION DETAILS

SHEET NO.

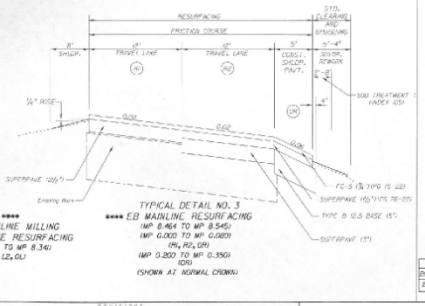


TYPICAL DETAIL NO. 3
**** EB MAINLINE MILLING
(MP 8.464 TO MP 8.545)
(MP 0.000 TO MP 0.080)
(SHOWN AT NORMAL CROWN)



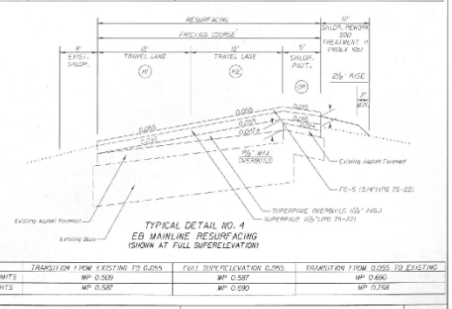
TYPICAL DETAIL NO. 4
EB MAINLINE MILLING
(SHOWN AT FULL SUPERELEVATION)

	TRANSITION FROM EXISTING TO 0.047	FULL SUPERELEVATION 0.047	TRANSITION FROM 0.047 TO EXISTING
BEGIN LIMITS	MP 0.509	MP 0.587	MP 0.690
END LIMITS	MP 0.587	MP 0.690	MP 0.768



TYPICAL DETAIL NO. 3
**** EB MAINLINE RESURFACING
(MP 8.464 TO MP 8.545)
(MP 0.000 TO MP 0.080)
(H, P2, OR)
(MP 0.200 TO MP 0.350)
(OR)
(SHOWN AT NORMAL CROWN)

**** WB MAINLINE MILLING
WB MAINLINE RESURFACING
(MP 8.320 TO MP 8.341)
(L1, L2, OL)



TYPICAL DETAIL NO. 4
EB MAINLINE RESURFACING
(SHOWN AT FULL SUPERELEVATION)

	TRANSITION FROM EXISTING TO 0.055	FULL SUPERELEVATION 0.055	TRANSITION FROM 0.055 TO EXISTING
BEGIN LIMITS	MP 0.509	MP 0.587	MP 0.690
END LIMITS	MP 0.587	MP 0.690	MP 0.768

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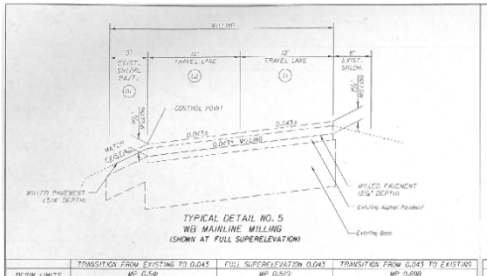
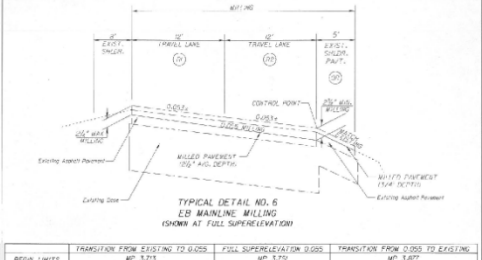
TYPICAL SECTION DETAILS

SHEET NO.



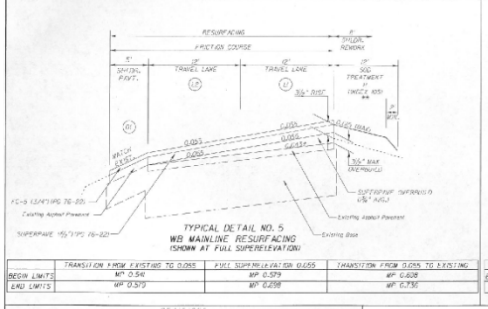
TYPICAL DETAIL NO. 5
WB MAINLINE MILLING
(SHOWN AT FULL SUPERELEVATION)

	TRANSITION FROM EXISTING TO 0.043	FULL SUPERELEVATION 0.043	TRANSITION FROM 0.043 TO EXISTING
BEGIN LIMITS	MP 0.541	MP 0.579	MP 0.698
END LIMITS	MP 0.579	MP 0.698	MP 0.736



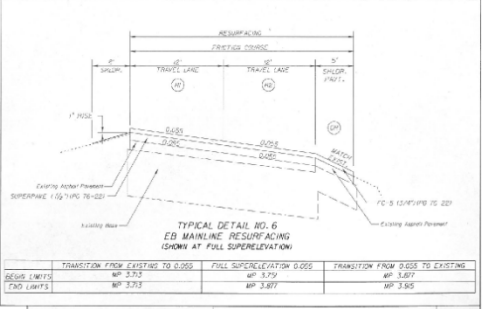
TYPICAL DETAIL NO. 6
EB MAINLINE MILLING
(SHOWN AT FULL SUPERELEVATION)

	TRANSITION FROM EXISTING TO 0.055	FULL SUPERELEVATION 0.055	TRANSITION FROM 0.055 TO EXISTING
BEGIN LIMITS	MP 3.713	MP 3.751	MP 3.877
END LIMITS	MP 3.751	MP 3.877	MP 3.915



TYPICAL DETAIL NO. 5
WB MAINLINE RESURFACING
(SHOWN AT FULL SUPERELEVATION)

	TRANSITION FROM EXISTING TO 0.055	FULL SUPERELEVATION 0.055	TRANSITION FROM 0.055 TO EXISTING
BEGIN LIMITS	MP 0.541	MP 0.579	MP 0.608
END LIMITS	MP 0.579	MP 0.698	MP 0.736



TYPICAL DETAIL NO. 6
EB MAINLINE RESURFACING
(SHOWN AT FULL SUPERELEVATION)

	TRANSITION FROM EXISTING TO 0.055	FULL SUPERELEVATION 0.055	TRANSITION FROM 0.055 TO EXISTING
BEGIN LIMITS	MP 3.713	MP 3.751	MP 3.877
END LIMITS	MP 3.713	MP 3.877	MP 3.915

REVISIONS			
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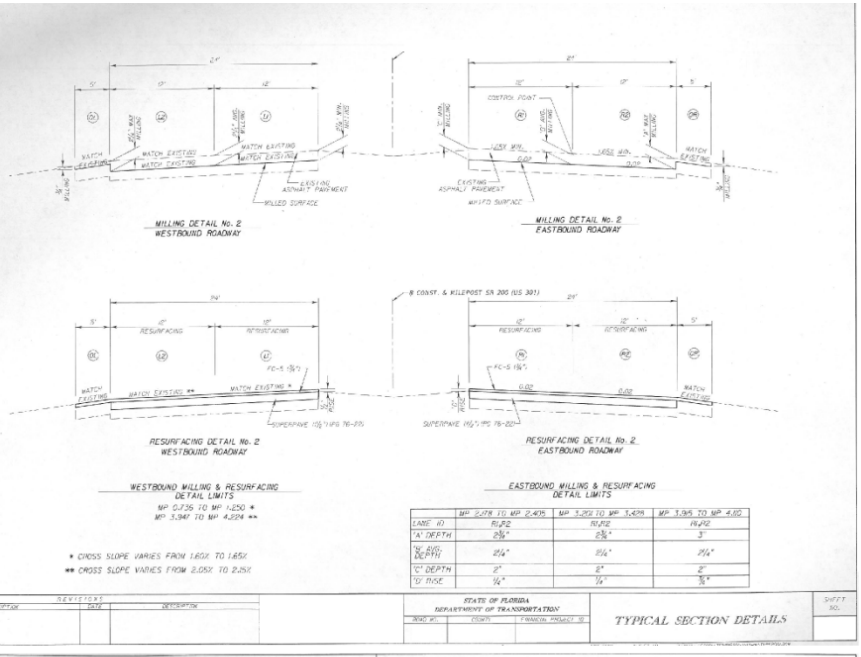
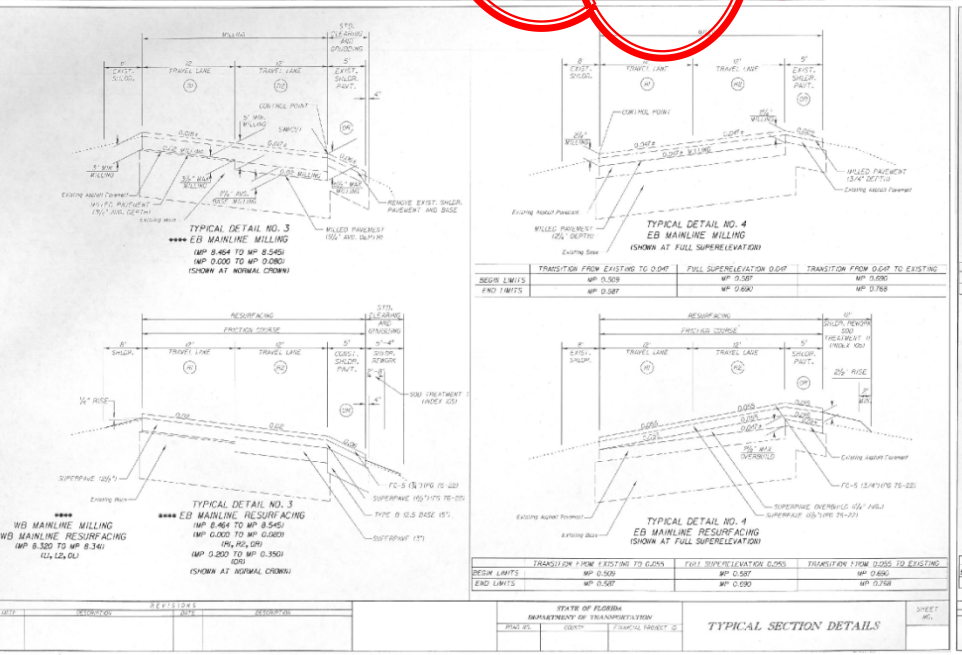
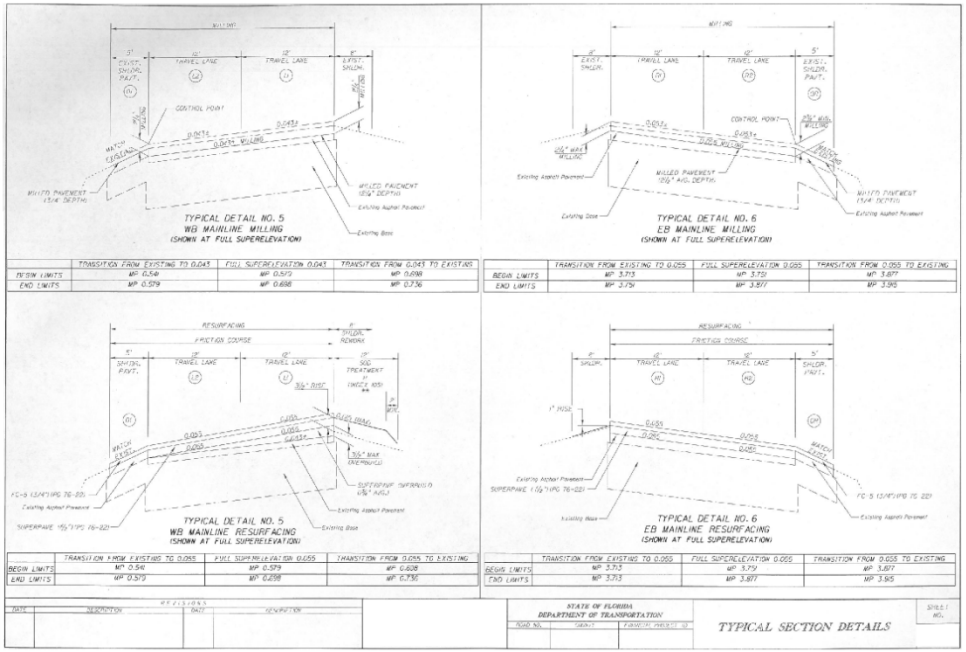
TYPICAL SECTION DETAILS

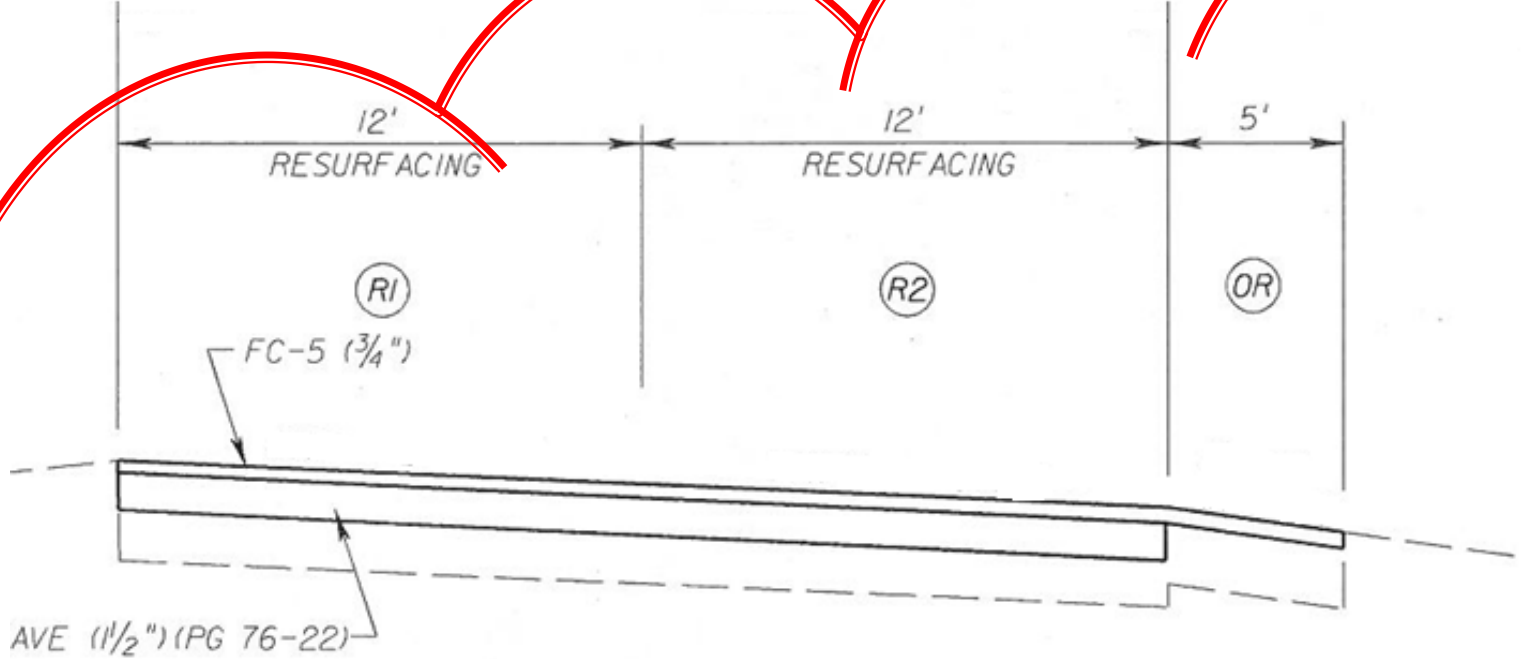
SHEET NO.


MILLING DETAIL No. 1
WESTBOUND ROADWAY
RESURFACING DETAIL No. 1
WESTBOUND ROADWAY
WESTBOUND MILLING & RESURFACING
DETAIL LIMITS
MP 8.341 TO MP 8.545
MP 0.000 TO MP 3.681
MP 3.947 TO MP 4.774
MP 14.162 TO MP 14.310
* DENOTES 3/4" FC-5, 2 1/2" SUPERPAVE 19.0 76-22 (L1, L2, R1, R2)
MILLING DETAIL No. 1
EASTBOUND ROADWAY
RESURFACING DETAIL No. 1
EASTBOUND ROADWAY
EASTBOUND MILLING & RESURFACING
DETAIL LIMITS
MP 8.320 TO MP 8.464
MP 0.280 TO MP 0.503
MP 0.768 TO MP 3.201
MP 3.408 TO MP 3.713
MP 4.310 TO MP 4.576
MP 14.288 TO MP 14.310
TYPICAL SECTION DETAILS


MILLING DETAIL No. 2
WESTBOUND ROADWAY
MILLING DETAIL No. 2
EASTBOUND ROADWAY
RESURFACING DETAIL No. 2
WESTBOUND ROADWAY
RESURFACING DETAIL No. 2
EASTBOUND ROADWAY
WESTBOUND MILLING & RESURFACING
DETAIL LIMITS
MP 0.735 TO MP 1.250 *
MP 3.947 TO MP 4.224 **
* CROSS SLOPE VARIES FROM 1.60% TO 1.65%
** CROSS SLOPE VARIES FROM 2.05% TO 2.15%
EASTBOUND MILLING & RESURFACING
DETAIL LIMITS
LANE ID
"A" DEPTH
"B" AVG. DEPTH
"C" DEPTH
"D" RISE
TYPICAL SECTION DETAILS


TYPICAL DETAIL NO. 3
**** EB MAINLINE MILLING
(MP 8.464 TO MP 8.545)
(MP 0.000 TO MP 0.080)
(SHOWN AT NORMAL CROWN)
TYPICAL DETAIL NO. 3
**** EB MAINLINE RESURFACING
(MP 8.464 TO MP 8.545)
(MP 0.000 TO MP 0.080)
(R1, R2, OR)
(MP 0.200 TO MP 0.350)
(OR)
(SHOWN AT NORMAL CROWN)
**** WB MAINLINE MILLING
WB MAINLINE RESURFACING
(MP 8.320 TO MP 8.341)
(L1, L2, OL)
TYPICAL DETAIL NO. 4
EB MAINLINE MILLING
(SHOWN AT FULL SUPERELEVATION)
TYPICAL DETAIL NO. 4
EB MAINLINE RESURFACING
(SHOWN AT FULL SUPERELEVATION)
TYPICAL SECTION DETAILS


TYPICAL DETAIL NO. 5
WB MAINLINE MILLING
(SHOWN AT FULL SUPERELEVATION)
TYPICAL DETAIL NO. 6
EB MAINLINE MILLING
(SHOWN AT FULL SUPERELEVATION)
TYPICAL DETAIL NO. 5
WB MAINLINE RESURFACING
(SHOWN AT FULL SUPERELEVATION)
TYPICAL DETAIL NO. 6
EB MAINLINE RESURFACING
(SHOWN AT FULL SUPERELEVATION)
TYPICAL SECTION DETAILS



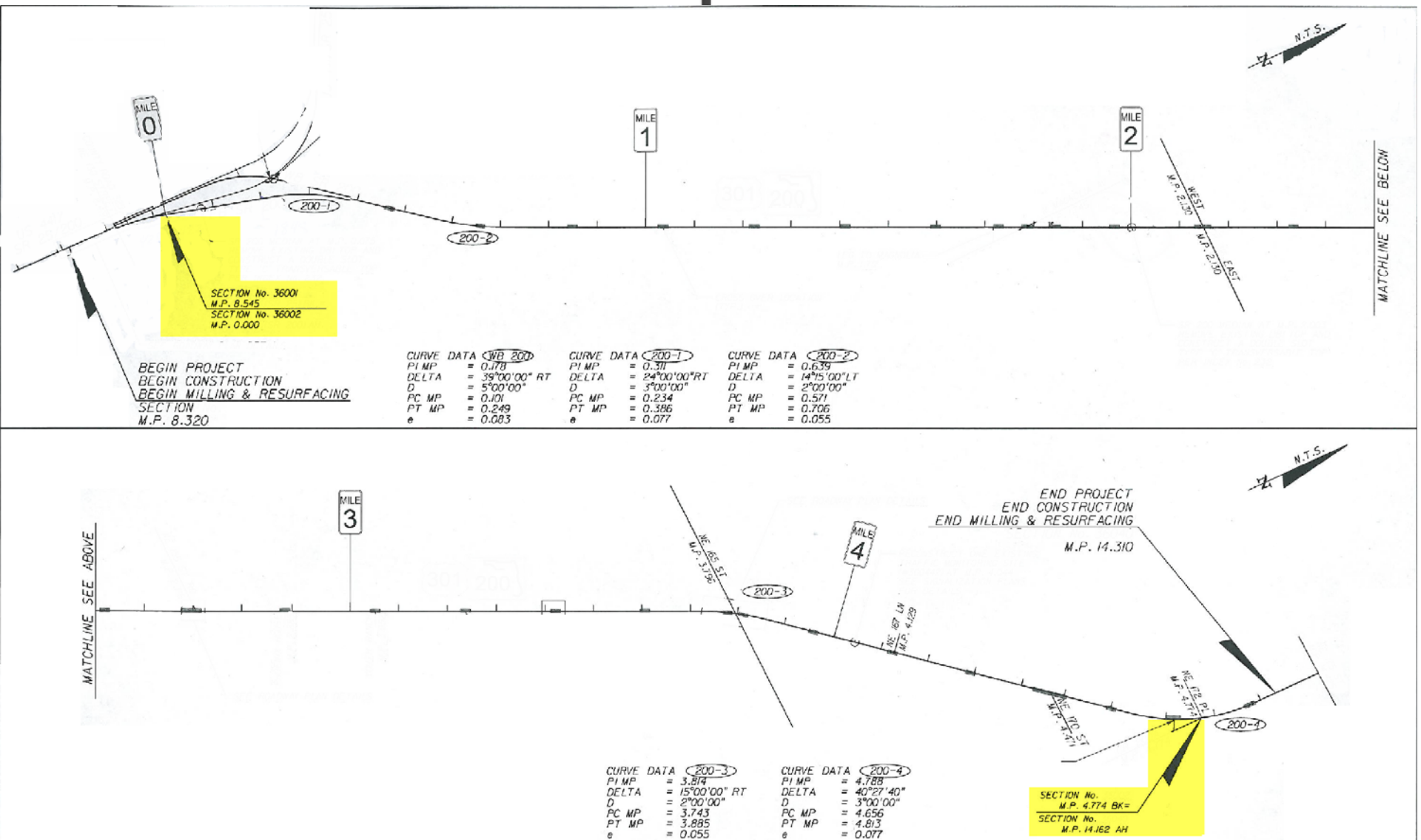
RESURFACING DETAIL No. 1
EASTBOUND ROADWAY

EASTBOUND MILLING & RESURFACING
DETAIL LIMITS

(R1)	(R2)	(OR)
*MP 8.320 TO MP 8.464	*MP 8.320 TO MP 8.464	MP 8.320 TO MP 8.464
MP 0.080 TO MP 0.509	MP 0.080 TO MP 0.509	MP 0.080 TO MP 0.200
MP 0.768 TO MP 2.178	MP 0.768 TO MP 3.201	MP 0.350 TO MP 0.509
MP 2.405 TO MP 3.201	MP 3.428 TO MP 3.713	MP 0.768 TO MP 4.576
MP 3.428 TO MP 3.713	MP 4.110 TO MP 4.576	MP 14.281 TO MP 14.310
MP 4.110 TO MP 4.576	MP 14.281 TO MP 14.310	
MP 14.281 TO MP 14.310		

- Keep in mind, the locations may not end up where you thought they would be…
- Is it a critical location?

Example #2



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

Forms

- Most FDOT forms require Stations to be used when they are filled out.
  - Equations within the form determine lengths

- This requires conversions to be made on any needed milepost from the plans
  - The addition of milepost equations makes it hard to do in the field
  - Mileposts are usually shown with three (3) decimals

Examples?

- Asphalt Daily Report of Quality Control
- Asphalt Straightedge Report
- Disposition of Defective Materials
- Roadway As-built Data
- Density Log Book

Can't Mileposts just be entered instead?

- This project is required to have station boards

- **5-7.4 Specific Staking Requirements**:
  For resurfacing and resurfacing-widening type projects, establish horizontal controls adequate to ensure that the asphalt mix added matches with the existing pavement. In tangent sections, set horizontal control points at 100 foot intervals by an instrument survey. In curve sections, set horizontal control points at 25 foot intervals by locating and referencing the centerline of the existing pavement.

- **5-7.4 Specific Staking Requirements: (cont)**

  For all projects, set a station identification stake at each right-of-way line at 100 foot intervals and at all locations where a change in right-of-way width occurs… For resurfacing and resurfacing/widening projects, set station identification stakes at 200 foot intervals.

  (That's every 0.018939 or 0.037878 miles…)

What can be done?

- Acknowledge the original information error
- Find known points or locations that can be called out on the plans
- Determine types of work suitable for mileposts

What did we learn?

- Additional Opportunity to Refine Construction Costs By Reducing Upfront Survey
- Lack of Additional Survey Will Add Some Costs to Construction
- Additional Coordination is Needed Between Construction Staff and the Contractor
- They aren't for everything. Know the limitations of their use

What questions can I answer for you?